STS 120 Return Samples: Assessment of Air Quality aboard the Shuttle (STS-120) and International Space Station (10A)

The toxicological assessments of 2 grab sample canisters (GSCs) from the Shuttle are reported in Table 1. Formaldehyde badges were not used. Analytical methods have not changed from earlier reports. The recoveries of the 3 surrogates (^{13}C-acetone, fluorobenzene, and chlorobenzene) from the 2 GSCs averaged 111, 82, and 78%, respectively. The Shuttle atmosphere was acceptable for human respiration.

Table 1. Analytical Summary of Shuttle Samples

Sample Location	Date of Sample	NMVOCs [a] (mg/m^3)	T Value[b] (units)	Alcohols (mg/m^3)	Formaldehyde ($\mu g/m^3$)
Flight deck (preflight)	10/23/07	0.3	0.03	0.2	--
Middeck (end mission)	11/07/07	3.4	0.27	0.8	--

[a] Non-methane volatile organic hydrocarbons.
[b] Calculated excluding CO_2, formaldehyde, and siloxanes.

The toxicological assessment of 7 GSCs from the ISS is shown in Table 2. Formaldehyde badges were not returned. The recoveries of the 3 standards (as listed above) from the GSCs averaged 100, 95 and 97%, respectively.

Table 2. Analytical Summary of ISS Results

Module/Sample	Approx. Date	NMVOCs[a] (mg/m^3)	T Value[b] (units)	Alcohols (mg/m^3)	Formaldehyde ($\mu g/m^3$)
Lab	9/04/07	4.1	0.57	3.0	--
FGB	9/04/07	5.5	0.78	3.7	--
SM	9/04/07	4.3	0.61	3.1	--
ANITA	10/10/07	7.7	0.98	4.8	--
FGB	10/10/07	5.8	0.68	4.4	--
SM (CM)	10/10/07	5.3	0.55	4.4	--
Node 2 First entry	10/27/07	10	1.07	5.7	--
Guideline		*<25*	*<1.0*	*<5*	*<120*

[a] Non-methane volatile organic hydrocarbons.
[b] Calculated excluding CO_2, formaldehyde, and siloxanes.

Based on these limited samples, the ISS atmosphere is acceptable for human respiration. The alcohol levels were well controlled throughout the period of sampling. As expected, the first entry sample into Node 2 was somewhat higher in pollutants than the nominal samples taken from standard modules.

John T. James, Ph.D.
Chief Toxicologist

Enclosures
Table 1A: Analytical concentrations of compounds found in the STS-120 GSCs
Table 1B: Analytical concentrations of compounds found in 10A GSCs
Table 2A: T-values of the compounds in table 1A
Table 2B: T-values of the compounds in table 1B